

WHAT IS CLAIMED IS:

1. A multi-band high-frequency circuit for performing wireless communications among pluralities of communication systems having different communication frequencies, comprising
 - 5 a high-frequency switch circuit comprising switching elements for switching the connection of pluralities of multi-band antennas to transmitting circuits and receiving circuits;
 - a first diplexer circuit disposed between said high-frequency switch circuit and said transmitting circuits for branching a high-frequency
10 signal into frequency bands of said communication systems;
 - a second diplexer circuit disposed between said high-frequency switch circuit and said receiving circuits for branching a high-frequency signal into frequency bands of said communication systems;
 - said first and second diplexer circuits each comprising a
15 lower-frequency filter circuit and a higher-frequency filter circuit, a bandpass filter circuit being used as said lower-frequency filter circuit in said second diplexer circuit, or disposed between said lower-frequency filter circuit in said second diplexer circuit and said receiving circuit, so that there is a bandpass filter between said second diplexer circuit and a lower-frequency receiving
20 circuit;
 - said high-frequency switch circuit comprising first to fourth ports, said first port being connected to a first multi-band antenna, said second port being connected to a second multi-band antenna, said third port being connected to said first diplexer circuit, and said fourth port being connected to
25 said second diplexer circuit; and
 - said switching elements being controlled in an ON or OFF state to select a multi-band antenna for performing wireless communications and to switch the connection of the selected multi-band antenna to said transmitting

circuit or said receiving circuit.

2. A multi-band high-frequency circuit for performing wireless communications among pluralities of communication systems having different communication frequencies, comprising

5 a high-frequency switch circuit comprising switching elements for switching the connection of one multi-band antenna to transmitting circuits and receiving circuits;

a first diplexer circuit disposed between said high-frequency switch circuit and said transmitting circuits for branching a high-frequency
10 signal into frequency bands of said communication systems;

a second diplexer circuit disposed between said high-frequency switch circuit and said receiving circuits for branching a high-frequency signal into frequency bands of said communication systems;

said first and second diplexer circuits each comprising a
15 lower-frequency filter circuit and a higher-frequency filter circuit, a bandpass filter circuit being used as said lower-frequency filter circuit in said second diplexer circuit, or disposed between said lower-frequency filter circuit in said second diplexer circuit and said receiving circuit, so that there is a bandpass filter between said second diplexer circuit and a lower-frequency receiving
20 circuit;

said high-frequency switch circuit comprising first to third ports, said first port being connected to a first multi-band antenna via a matching circuit, said second port being connected to said first diplexer circuit, and said third port being connected to said second diplexer circuit; and

25 said switching elements being controlled in an ON or OFF state to switch the connection of said multi-band antenna to said transmitting circuit or said receiving circuit.

3. The multi-band high-frequency circuit according to claim 1 or 2,

wherein a coupling circuit for taking a transmission power from pluralities of communication systems is disposed between said high-frequency switch circuit and said first diplexer circuit.

4. The multi-band high-frequency circuit according to claim 3,

5 wherein said coupling circuit is constituted by a coupling capacitor, and comprises a matching circuit disposed between said coupling circuit and a detection circuit.

5. The multi-band high-frequency circuit according to claim 3,

10 wherein said coupling circuit is constituted by a directional coupler comprising a main line and a sub-line, and comprises a grounded resistor connected to one end of said sub-line and a matching circuit disposed between the other end of said sub-line and a detection circuit.

6. The multi-band high-frequency circuit according to any one of claims 1-5, wherein each of said first and second diplexer circuits is

15 constituted by parallel-connected lower-frequency filter circuit and higher-frequency filter circuit with one end as a common port, said lower-frequency filter circuit being a filter circuit permitting a 2.4-GHz-band, high-frequency signal to pass but attenuating a 5-GHz-band, high-frequency signal, and said higher-frequency filter being a filter circuit permitting a
20 5-GHz-band, high-frequency signal to pass but attenuating a 2.4-GHz-band transmission signal.

7. The multi-band high-frequency circuit according to claim 6,

wherein said lower-frequency filter circuit in said second diplexer circuit is constituted by a phase circuit and a bandpass filter circuit having a 2.4-GHz
25 passband, said phase circuit controlling the impedance of said bandpass filter circuit in a band of 5 GHz to high impedance when viewed from said high-frequency switch circuit.

8. The multi-band high-frequency circuit according to any one of

claims 1-7, comprising a first balanced-to-unbalanced converter disposed between said lower-frequency filter circuit in said second diplexer circuit and said receiving circuit, and a second balanced-to-unbalanced converter disposed between said higher-frequency filter circuit in said second diplexer circuit and said receiving circuit.

9. The multi-band high-frequency circuit according to any one of claims 1-8, comprising a transmitting/receiving means for modulating transmission data and demodulating receiving data in each communication system, and a switch circuit controller for controlling the switching of said high-frequency switch.

10. A multi-band high-frequency circuit component comprising the high-frequency circuit recited in any one of claims 1-9, comprising a laminate of substrates having electrode patterns and elements mounted onto said laminate, at least part of inductance elements and capacitance elements being constituted by said electrode patterns, and at least said switching elements being mounted onto said laminate, among circuit elements constituting said high-frequency circuit.

11. A multi-band communication apparatus comprising the multi-band high-frequency circuit recited in any one of claims 1-10.